

derm. Some of these become differentiated into epithelio-muscle elements that constitute the vasothelium, and others into blood-cells. Thus the study of annelids leads Vejdowsky to conclude that their hæmocœl is a hypoblastic structure *sui generis*, not comparable to that of arthropods or of molluscs, but rather to the cardiac vasothelium in vertebrates. Such a result emphasises that relation of vascular system to the alimentary tract which topography has insisted upon.

In his article on the morphology of the cestode body, Prof. Spengel stoutly supports the monozoic theory. He regards the Bothriocephalidæ as the most primitive tapeworms, and considers that in the highly modified Tæniidæ we have simply a coincidence of somatic and gonidial segmentation areas. Incidentally he suggests the comparison of the scolex with the hinder end of segmented worm, and emphasises the singular nature of the cestodes by pointing out their entire lack of true regenerative power.

The remaining anatomical papers deal with the modifications of clasping organs in arboreal mammals, with the head of collembolous and culicid insects, the nervous system of leeches, and certain abnormal gasteropods.

Of the embryological memoirs, the accurate and laborious research of Wierzejski on the cell-lineage of Physa will be welcomed as a topographical paper of the first rank. Prof. McIntosh contributes a well illustrated account of the life-history of the shanny, and then follow memoirs on the early development of the blind-worm, on the breeding habits of Rhinoderma and of the salamanders.

The physiological papers are of more general interest. Prof. Häcker continues his illuminating work on the skeleton of the Radiolaria by treating the Tripylaria from the same ecological standpoint which he adopted in his paper of last year. Häcker is the most active of a band of workers who are putting new life and new significance into the merely geometric descriptions of earlier students of these skeletal products. Dr. Rhumbler gives a further instalment of his work on the mechanics of streaming movement in Amœbæ, and shows some interesting stream figures produced by dropping chloroform water upon shellac. He fully recognises the inward and autogenous control that dominates those displays in organisms that we cannot parallel in not-living matter, but he holds that in Amœba the phenomena of movement and feeding are capable of mechanical explanation in terms of the aggregation theory which he has formulated elsewhere.

Dr. Jordan contributes an essay on the origin of species in Lepidoptera. His main thesis is to the effect that geographical subspecies, and no other variations, are the material out of which new species have been evolved. Much of the paper is summarised from his earlier work, and represents a line of research to which several naturalists are applying themselves. The work of Petersen on the Fritillaries in particular pursues the method employed by Dr. Jordan, but in a more comprehensive manner, and it

is to be hoped that these important results may be rendered more available to the student of evolution than they now are by a new mode of presentation, graphic, tabular, or other than textual description.

Lastly, the memoir of the Baroness von Linden on the influence of heat, cold, and gases upon the coloration of Vanessid butterflies constitutes a further instalment of the author's prolonged investigation. The general conclusion drawn from these experiments is that whatever lowers the rate of pupal metabolism increases amount of black imaginal pigment and diminishes the extent of red colour in the butterfly.

F. W. GAMBLE.

### THE BIRDS OF TUNISIA.

*The Birds of Tunisia.* Being a history of the birds found in the Regency of Tunis. By J. I. S. Whitaker. 2 vols. Royal 8vo. Pp. xxxii+294 and xviii+410. Plates and maps. (London: R. H. Porter, 1905.) Price £3 3s. net.

THE two handsome and beautifully illustrated volumes containing the history of the birds of the Regency of Tunis form a fitting crown to the years of work in the field, the museum, and the library which their author has devoted to the ornithology of this until recently little known country. They form too a valuable contribution to the avifauna of the western Mediterranean region; for although the present work purports to be merely a history of the birds noticed in Tunisia, and of their lives as observed in that country, the author has thought it advisable, when possible, to allude to the occurrence of the various species also in Algeria and Morocco, as likewise, in some cases, in Tripoli, and in the Mediterranean basin generally.

The articles on various warblers (especially the interesting remarks on their life-history), and other birds which are met with most commonly in that region, will be most welcome, even to those whose interests are restricted to the birds which figure on the British list. Tunisia, a long and somewhat narrow country, stretching from the Mediterranean back in the vagueness of the great desert, presents a great variety of natural features and climate; and the contrast between the well-watered, wooded and mountainous region north of the Atlas Mountains and the rainless, sandy and rocky desert country is very great. To these circumstances, and to the fact, pointed out by the author, that few countries are geographically so favourably situated as the Regency for the observation of the migration of birds, the wealth of the Tunisian avifauna is due. No less than 365 species and subspecies of birds are included in this work; and only about thirty-five of these have to be relegated to the roll of occasional and accidental visitors. Two beautiful photogravures give an excellent and most truthful idea of the character of the scenery and the traveller's mode of life in the south of the country; while other plates introduce the reader to some of those wonderful Roman ruins, so marvellously preserved in that dry, clear air, which so startle the inexperienced wanderer in the central parts of Tunisia.

Each species is fully described, and a careful account of its distribution in Tunis, with some observations on its range in the neighbouring Mediterranean countries, is followed by an interesting and graphic account of its nesting habits, song, and life-history generally.

The four natural divisions into which the Regency may be divided appear to have each certain species peculiar to it, or more abundant in it than in the other regions. Besides this, in the case of some resident species, such as the crested larks, for instance, different forms of the same species are to be found in the different regions, the variation of these forms being in some cases considerable, and not always limited to the coloration of the plumage alone, but occasionally extending to the structural parts of the birds. The crested larks, says the author, afford a striking example of the extent to which local variation may be carried by natural causes, and no country probably affords a better opportunity of observing and studying this subject than Tunisia. The author is naturally in favour of recognising subspecies, and the use of trinomials for them; and his remarks hereon and upon what constitutes a species and a subspecies may be read with great advantage.

Many noteworthy and peculiar birds may be studied in Tunisia, but probably the families of larks and chats are better represented than any other; of the former twenty-one and of the latter eleven species and subspecies are treated, and the fifteen beautifully executed coloured plates which adorn these sumptuous volumes are largely devoted to illustrating these two families. Tunis is indeed especially rich in larks; and years of study, a long series of specimens collected by himself, and an examination of the various types in museums and the literature of the subject, added moreover to his having had the advantage of observing the birds in life, have enabled the author to clear up many puzzling points respecting the specific and subspecific value of the numerous forms of larks. We have here a very clear and lucid exposition of the larks of the western Mediterranean basin; and especially of the crested larks (the most puzzling of them all), of which the author considers that there are two distinct groups, viz., one including the common crested lark of Europe, the other the small-billed crested lark of Southern Spain, each with its allies.

The necessity for protective colouring is undoubtedly great in a country like Southern Tunisia, where the scanty vegetation affords but little shelter to its feathered denizens. Hence it is that the plumage of most of the species resident in the desert and semi-desert region harmonises with the sandy coloration of the soil. This is especially remarkable in the larks. But the author points out that although at first sight it may appear curious that the chats, except in a few instances, are more or less conspicuously coloured, it will, however, be found that the conspicuously attired chats frequent, as a rule, rocky and broken ground full of dark clefts and fissures, where the rocks are sometimes black and in other cases of a glittering white, and in such situations a strongly marked plumage is really far less con-

spicuous than a uniform light coloured one would be. The ravens also remain as black as ever, but they, too, frequent cliffs and rocks for the most part, and their case seems analogous to that of the rock-haunting chats. Two good maps enable the reader unacquainted with the country to follow the author's remarks on its topography. O. V. APLIN.

#### AMŒBÆ AND THEIR ALLIES.

*British Fresh-water Rhizopoda.* Vol. i. By James Cash, assisted by John Hopkinson. Pp. x+148+xvi plates. (Ray Society, 1905.) Price 12s. 6d. net.

THE important discoveries that have recently been made on the morphology of Protozoa have revived the interest in British fresh-water amœbæ and their allies, and a monograph on the subject has been regarded for some time as a special need of the zoologist.

Mr. James Cash has been known for some years as an ardent microscopist with a special knowledge of the forms and habits of the species of fresh-water rhizopoda in the north of England, and he has given us in this volume the benefit of his experience in this line of work, illustrated by many beautiful original drawings of the living organisms. As a work of reference for the names of species, and in so far as it suggests to the young amateur naturalist exercises for his amusement and instruction, it will be useful; but as references to important details of structure and reproduction are in general meagre, often misleading, and in many instances omitted altogether, it will not supply the need that is felt. The description of the cell (p. 3) as "physiologically, a minute vesicle, or closed sac, the enveloping membrane or cell-wall enclosing the protoplasmic substance in which the functional phenomena reside," appears to us singularly unfortunate in an introduction to the study of the Protozoa.

The description of the nucleus is very short, but long enough to contain considerable extracts from the work of Calkins, whose views the author adopts, but there is no reference to the chromidial network which the recent papers of Hertwig, Schaudinn, and others have shown plays such an important part in reproductive phenomena of many rhizopoda. It is disappointing to find no reference, either in the introduction or in the systematic part, to the evidence of a developmental cycle in the life-history of Amœba, based on the researches of Scheel and Calkins.

In the very brief account of the reproduction of Arcella, again, although Hertwig's important paper published in Kupffer's *Festschrift* is included in the list of references, the statements made are incomplete and misleading. Many other criticisms similar to these could be made, but the critic is disarmed by the confession in the preface that the author has not "investigated very closely the physiological problems associated with the life-history of these organisms." With this confession before them, it seems difficult to account for the action of the council of the Ray Society in undertaking the publication of this mono-